

Grade 5 Program: Weather

**"Our Lessons Really Rock!"**

## Scenic Caves Nature Adventures

Scenic Caves Nature Adventures Education Program 2002

## Earth and Space Systems: Grade 5

### Weather

#### Introduction

Hurricane Mitch, the Ice Storm of 1998, the wildfires in Indonesia. Three events that have caused the world to turn its attention to our weather. Throughout history, people have tried to live in spite of weather - coping and adapting to the best of their ability. Weather is the term used to describe the changing state of the atmosphere. Weather conditions such as sunshine, rain, snow, sleet, or hail cause dramatic changes in land forms and rocks and seriously affect the lifestyles of those who are not prepared. In spite of recent innovations in technology, we have still not been able to predict weather in time to adequately prepare for any ensuing disaster. This past year, El Nino caused the weather to be one of the "hottest" topics of discussion. Although El Nino appears to have a very lengthy earth history (researchers have linked the French Revolution to the poor crop production caused by El Nino) it has not been until recently that the average person has become aware of this weather phenomenon. It is time to get a handle on what on earth is going on!

#### Student Demonstration

Trace weekly weather phenomenon at [www.bconnex.net/~lepages/earthweek](http://www.bconnex.net/~lepages/earthweek) to get a handle on the major climatic factors and patterns of weather. Students will focus on a few countries that have adapted to their weather and contrast these countries to those who have not adapted to the weather. Through simple investigations at the weather station located at Scenic Caves Nature Adventures, students will learn to identify a variety of instruments and weather patterns which are used to predict a variety of weather patterns. Since the station is located

nearby our Great Lakes, students will also be able to investigate the affect of these lakes on our local weather patterns. Through the use of instruments used to detect temperature, wind speed, atmospheric temperature, average rainfall - students will gain a feel for the study of meteorology.

### **Program Areas**

Geography, Science and Technology, Language

### **Keywords and Vocabulary**

meteorology, atmosphere, troposphere, stratosphere, mesosphere, ionosphere, equator, molecule, wind, masses, Jet Stream, prevailing winds, high pressure system, low pressure system, climate cirrus, stratus, cumulus, humidity, evaporation, condensation, precipitation, fronts, tornado, barometer, El Nino, La Nina, cyclone, hurricane, monsoon

## Teaching Strategies and Learning Activities

Be sure that students are aware of the trip that they will be taking to Collingwood Scenic Caves at the end of this unit. Here, they will get a chance to investigate an actual weather station and also investigate the lake-effects that are caused by the Great Lakes.

### **Lesson #1**

- ✓ Brainstorm with students the importance of our atmosphere and its composition.
- ✓ Lecture on the composition and structure of the atmosphere. Have students take notes.
- ✓ Have students label the atmospheric layers on diagram #1

### **Lesson #2**

- ✓ Discuss the difference between weather and climate
- ✓ Identify, using an atlas the World's Climatic Regions. (Blackline available)
- ✓ Discuss which countries have similar climatic regions and why.
- ✓ Answer which climate you live in?

### **Lesson #3**

- ✓ Have students set up a new duo-tang to collect weekly editions of Habit@Earth
- ✓ Assign students to review the stories and to complete the assignments on a weekly basis.
- ✓ Hand out this week's version of Habit@Earth and discuss the stories - paying special attention to the weather - related stories. Assign selected questions.

#### **Lesson #4**

- ✓ Correct Habit@Earth questions and discuss why these areas may have experienced the type of weather that put them in the news.
- ✓ Hand out copies of the background information sheets.
- ✓ Divide the class into groups, so that each group has 5 words to define.
- ✓ Students will skim through the information to locate the 5 words that their group needs to find. Underline the sentence that contains the word and determine the definition of the words.
- ✓ Discuss the answers up at the board, recommended one group per day. Record the answers on chart paper which can be kept at the front of the room.

#### **Lesson #5**

- ✓ Review vocabulary.
- ✓ Discuss wind related terms (fronts, air masses, storms).
- ✓ Discuss the difference between storms, tornadoes and hurricanes.
- ✓ Using the atlas, refer to the world climate pages, define tropical revolving storms.
- ✓ Have students indicate the location of typhoons, hurricanes and cyclones on a blank world map.
- ✓ Note the difference in seasons for these storms between the northern and the southern hemispheres (due to the different tilt of the Earth)

#### **Lesson #6**

- ✓ Review vocabulary
- ✓ Note the existence of 4 major air masses. Have students label these air masses on a blank world map and identify the fronts where the masses meet. Again, note the differences between January and July. In which air mass region do you live? (Use background information sheets as a resource)

- ✓ Teach lesson about air movement - how hot air rises and cold air falls. (Diagram) Read aloud relevant section from background information sheets.
- ✓ Have students begin temperature tracking sheet to record the temperature in their own homes. How accurate is your household thermostat?
- ✓ Do they have any predictions to make before beginning the activity? Record on board or on chart paper.

### **Lesson #7**

- ✓ Discuss one event from Habit@Earth in terms of how the people could have better prepared for the storm.
- ✓ Assign students to research the technology that is used for predicting weather.
- ✓ Have students list the instrument and describe its purpose. (*Due Lesson # 9*)

### **Lesson #8**

- ✓ Hand out the Vocabulary match-up sheet and allow students to work through the sheet in class.
- ✓ Take up answers.
- ✓ Discuss any current weather-related news stories, or refer to a new Habit@Earth page.
- ✓ Assign first 10 research questions located in the Introductory Package from Collingwood Scenic Caves (*Day 1*).

### **Lesson #9**

- ✓ Read through, together, the information sheet about the Influences of the Great Lakes.
- ✓ Have students answer questions about the information (blackline master available).

- ✓ Correct the work.
- ✓ Discuss their relative location to the Great Lakes and whether their weather patterns are affected by the lakes.
- ✓ Correct Day 1 Caves' questions and assign *Day 2*.

### **Lesson #10**

- ✓ Correct Day 2 questions and assign *Day 3*.
- ✓ Correct the meteorology research work together. List answers on the board.
- ✓ Discuss how modern technology cannot always prepare people for the weather.
- ✓ Introduce background information about El Nino and La Nina (check out the web-site given for further information).
- ✓ Have students complete worksheet about El Nino (blackline available)
- ✓ Correct questions from Day 2 and assign *Day 3*.

### **Lesson #11**

- ✓ Review vocabulary.
- ✓ Correct El Nino sheets.
- ✓ Correct Day 3 questions and assign *Day 4*.

### **Lesson #12**

- ✓ Correct Day 4 questions.
- ✓ Introduce package of materials that they will take with them on their trip to Scenic Caves (Package includes tracking sheets).
- ✓ Work through the Internet Scavenger Hunt activity that has been developed to guide students through the Scenic Caves web-site.

### **Lesson #13**

- ✓ This will be the field trip to the Scenic Caves.

**Extension:** Have students complete the extra worksheets that encourage them to investigate current events - weather stories.

## Background Information

### Introduction

Think of all the changes that are constantly occurring on the surface of the earth. Rocks are slowly crumbling. Winds grind down rocks. Fields are losing their soil. Water carries away sediment and deposits it somewhere else. Gullies are being formed. The earth's surface is changing all the time. Water, wind, and ice are constantly at work, wearing away and building up the land. Some changes take place in a very short time. Floods can change the course of a river in a few days. Dust storms can carry huge amounts of soil away very rapidly. However, most of the big changes in the earth's surface take thousands of years. At various times, the earth is exposed to long periods of extreme cold followed by periods of intense heat. Parts of the land we see now were once under water and land forms that were once above water are now deep under the water. In most cases the changes are so gradual we cannot detect them in the span of a lifetime. Today we want to learn how our weather has built up or worn down the earth's surface to form mountains, valleys, deserts, plains, soil, lakes and rivers.

The study of weather is called meteorology and the people who try to predict what the weather will be like are called meteorologists.

The atmosphere is the gasses that surround our earth. The gasses are found in layers: the first four, moving away from the earth are called the troposphere, the stratosphere, the mesosphere and the ionosphere. The troposphere is the layer where we find the air that we breathe. This is also the layer where most of the clouds are formed.

Some heat is produced when the sun's rays pass through the atmosphere. But, the atmosphere gets most of its heat through the "reflected" heat off of the earth. The earth is not heated evenly. Some parts of the earth remain cold year round (Arctic regions) while others remain hot year round (regions around the Equator).

This is because the sun is farther away from some places around the earth than others. The Equator is the closest place to the Sun and thus, gets the most exposure to the heat generated by the Sun. Further, land tends to reflect more heat than water and so, the air over land is warmer than the air over water. The cold air over the Poles keeps the icebergs from melting.

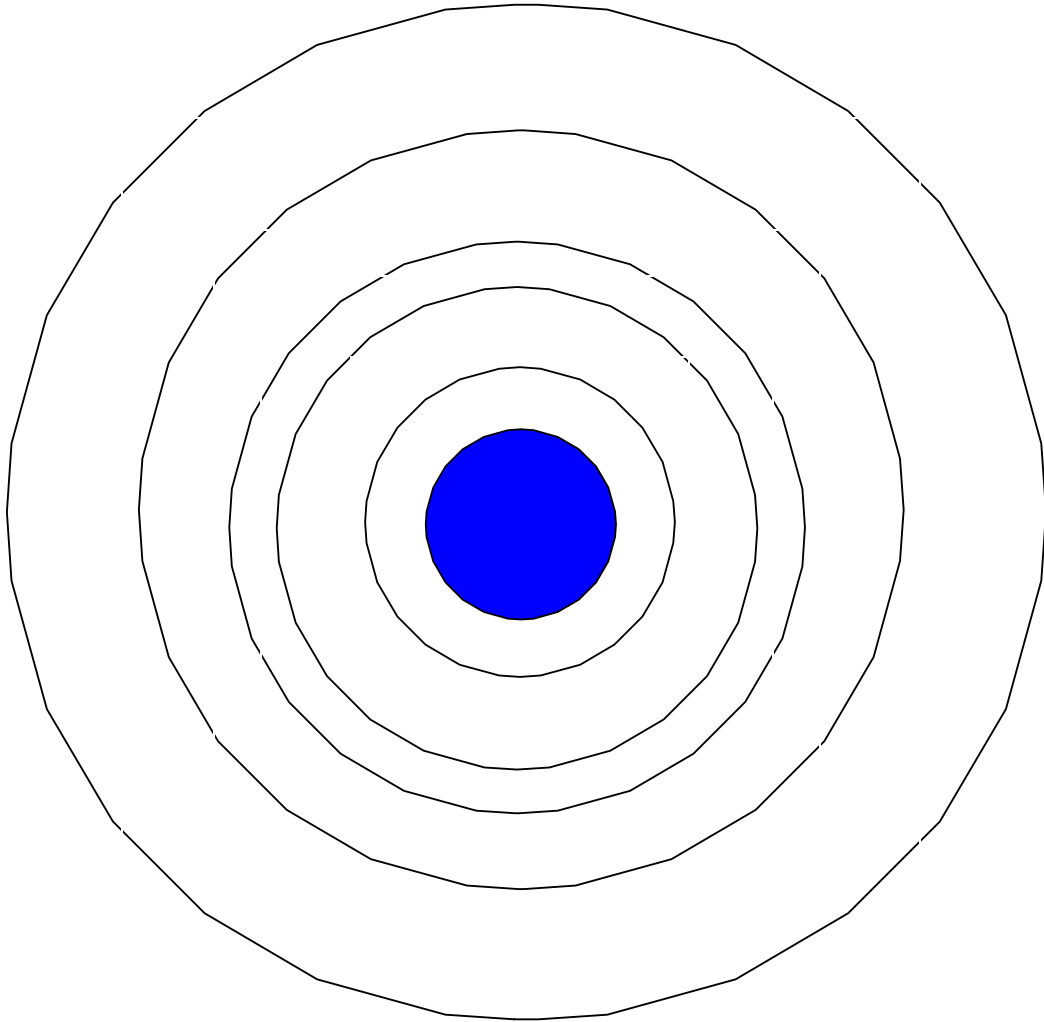
Hot air rises and cold air falls. Hot air is lighter since the molecules that make up the air are further apart as they are much more active. Since hot air is less "*dense*", it floats above the cold air. You can see an example of this in your own home. In the summer, the hottest place in your home is generally the attic - and the coolest is the basement. This same motion occurs outside as well. As the air heats, it rises and is replaced by cold air. As the cold air is eventually heated, it begins to rise and the process continues. This continual motion is what we call "*wind*".

Large, slow-moving bodies of heated or cooled air are called masses. It is these masses that are responsible for moving clouds across the earth's surface. In Canada and the United States, the air masses generally move from west to east since the jet stream (found in the troposphere) moves from west to east as a result of the earth's rotation. These winds are called prevailing winds.

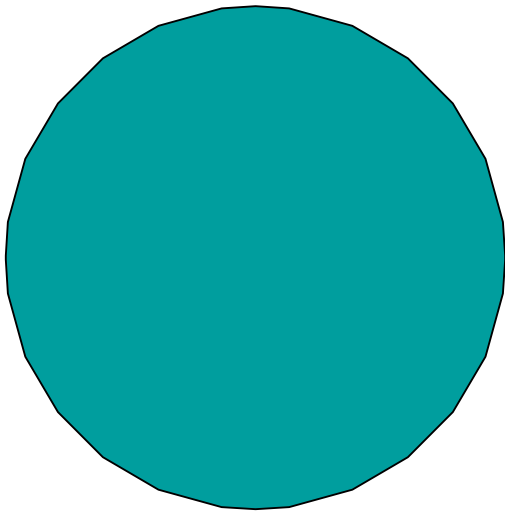
Weather is affected by air masses. There are seven major air masses in North America: three in the north, and four in the south. Northern air masses are usually cooler (high pressure) systems. Southern masses tend to be warm because of their relationship to the Sun. Remember that warm air is lighter and so we call these masses "low pressure" systems. The word pressure refers to the weight of the air pressing down on the earth.

Air masses form over all parts of the world - ranging from areas of high moisture (over the oceans) and areas of low moisture (the deserts). Hence, the amount of water that is contained in an air mass is related to the area where it was formed. Air masses that come from warm waters tend to release moisture when they hit colder land.

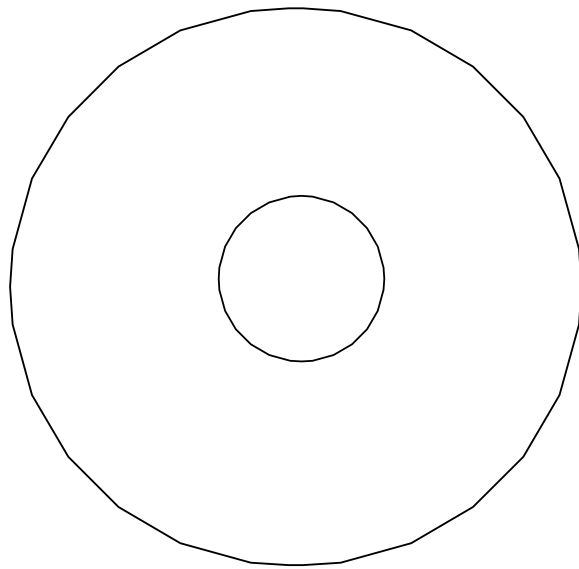
# Our Atmosphere



**The Air Over the equator and over the continents is  
warmer than the air  
above the North and South Poles**



**Sun**



**The Earth and surrounding  
Atmosphere**

1. What do the squiggly lines running from the Earth back through the atmosphere indicate?

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2. How could you demonstrate this phenomenon using a bowl of water, a piece of saran wrap, a thermometer and a steady ray of sunlight?  
Design and run a "global warming" experiment.

## Clouds

Clouds are formed from water that has evaporated. They are formed as a result of weather conditions and because of this, they may be used to predict certain weather. Cirrus clouds are formed high in the troposphere and often appear "feathery". They indicate that the weather will change soon. Stratus clouds usually indicate stormy weather will arrive - they look like flat sheets and generally cover the sky. Cumulus clouds are very distinctive appearing like huge piles of cotton. As they grow, they become thicker and darker and will bring storms.

Not all water that evaporates forms clouds, however. Some hangs around in the air and tends to make the air "thick". This kind of moisture is a vapour, which is known in meteorological terms as humidity. Warm air can hold more vapour than cold air. On a hot day, the moisture from the air surrounding a cold drink, condenses on your glass as it is cooled by the cold drink. The more humidity, or available water, the more "sweat" on your glass. Humidity can make you feel very uncomfortable on a hot day - and one must choose to dress according to the humidity level.

## Precipitation

A bucket can only hold so much water, and then it overflows. Similarly, clouds can only hold so much moisture - and then they overflow (we call this precipitation). Rain, snow and hail are all forms of precipitation. Water falling to earth collects in rivers, lakes and oceans. The heat from the sun warms up the water and gives it energy. As soon as individual water molecules have enough energy, they separate from the water mass and rise (evaporation) as water vapour. As the vapour reaches the colder limits of the atmosphere, the molecules move closer together (condense). Clouds are formed and as they become full, they drop their water (precipitation) on the earth. The system begins again with the warming of the water by the Sun.

## Fronts

Since masses of air can be formed all over the world, there are times when a warm air mass and a cold air mass "meet". The edges of the masses that meet are called "fronts". As introduced earlier, the warm air mass is lighter and will therefore

float above the cold mass. When a cold air front moves towards a warm front, storms occur - similar to your cold drink meeting the surrounding hot, moist air. The warm air cools rapidly to form heavy clouds, which drop precipitation. Thunderheads (type of cumulus cloud) are formed this way. The appearance of thunderheads indicates thunderstorms. Lightning accompanies this type of storm. As the lightning jumps and moves through clouds it causes air to expand. Remember that lightning is heat. It is this rapid expansion of the air that causes the loud noise called thunder.

If a warm mass moves over a cold air mass, the edge is called a warm front. The result is NOT a dramatic change in weather. The warm air tends to cool more slowly and so different types of clouds are formed.

Tornadoes form when cold fronts move in above warm fronts. The hot air must rise, but it tends to spin as it rises. This forms a funnel-shaped cloud. Meteorologists continue to develop instruments that make tornado detection more accurate as the results of a tornado can be quite devastating.

Hurricanes form over warm oceans near the equator, usually during the months when the Sun is at its closest pass to cause the air to heat up - June and November. The water evaporates quickly - but cools quickly too. High winds and heavy rains result.

## **Measuring the Weather**

Barometers measure air pressure over periods of time. Rising air pressure (cool air is heavier than warm air) means good weather. Falling air pressure indicates a storm may be coming. Satellite technology is used to complement barometers. Weather satellites circle the earth on a particular course. The cameras that are on satellites send signals back to earth where the images are translated onto weather maps. Swirling images of clouds are used to track storms.

## **Adaptation to the Weather**

In some parts of the world, the weather patterns (climate) is much more severe than in others. Further changes have occurred to the earth as a result of human activity (increased CO<sub>2</sub> emission, for example). It is believed that "greenhouse gas emissions" have caused our planet to heat by several degrees. As a result, water levels have risen to cause continual flooding in low-lying counties of Bangladesh, to cause drought in areas previously know to flood, and to cause fish to migrate to areas previously too cold for them to exist. Generally, changes in weather occur over millions of years and things have been able to adapt to deal with weather extremes.

## **The Influence of the Great Lakes**

The Great Lakes have a large effect on the weather patterns of surrounding areas. Lake-effect snow, for example, is caused when cold Arctic air moves over the relatively warm waters of the Great Lakes. (Remember that water holds heat longer than the land)

Clouds and precipitation that form over the Great Lakes can occur any time the water is much warmer than the overlying air. If this happens in winter, the resulting precipitation is snow, and in summer - obviously rain or hail.

Westerly or northerly winds bring cold, dry Arctic air over the warmer waters of the Great Lakes. As the Arctic air passes over the warmer lake surface, the air is heated from below. Also, because the air is very dry, lake water evaporates easily into the air mass.

The added heat and moisture near the surface make the air mass very turbulent and buoyant. The warm, moist air at the surface is lifted slightly by turbulence and therefore cools and rises. The temperature decrease of this air, however, is not as rapid as in the surrounding air. Now this pocket of air is warmer than the air around it. This difference will make the air keep rising.

Of course, because the air is very moist, it doesn't have to cool much in to order to form cumulus clouds. When clouds form, water vapour condenses into tiny droplets, or more often in lake-effect cases, ice crystals.

Eventually, the ice particles grow into snowflakes. When that happens, these clouds start producing heavy snow showers over the lake and on the downwind shore. These lake-effect snows can leave behind as much as a foot of snow in just a few hours.

The main requirement for any lake-effect snow event to occur is cold, dry Arctic air spilling over a body of warmer water.

## **El Nino**

"Periodically, the flourishing fish populations commonly found off the west coast of Peru South America are replaced by the sight of dead fish littering the water and beaches. Unusual weather conditions occur around the globe as jet streams, storm tracks and monsoons are shifted. Such disarray is caused by a warm current of water that appears every three to seven years in the Eastern Pacific Ocean called El Nino.

El Nino results when trade winds around the Eastern Equatorial and Central Pacific Ocean become very weak and the affected waters become abnormally warmer than usual. This appears to happen every two to seven years, although the average has been, until recently, about once every 3 - 4 years and lasting 12 - 18 months.

During El Nino years, there are fewer hurricanes in the Atlantic.

Originally, the term El Nino (the Christ child) appeared as a warm southward flowing ocean current that occurred every year around Christmas off the west coast of Peru and Equador. El Nino was later associated with unusually strong warming that disrupted local fish and bird populations every few years. However, El Nino is now known to be associated with larger scale, warm events.

During non-El Niño, times, the Earth's warmest ocean water is in a huge pool in the western Pacific. East-to-west trade winds push water heated by the tropical sun westward, piling it up around Indonesia and other places west of the International Date Line. Every once in a while the trade winds weaken and the warm water moves eastward across the Pacific to South America. When the warm water reaches the South American Coast it spreads north and south along the coast, causing warmer waters off Peru.

Oceanic events have an effect on our atmosphere. Any changes to ocean temperatures will affect the amount of storm activity. Tropical thunderstorms usually begin and feed from the hot, humid air over the oceans. The hotter the air, the stronger and bigger the thunderstorms. As happens with El Niño, the warm water of the Pacific moves east and the biggest thunderstorms move with it. This affects high-altitude jet stream winds, masses of air moving from west to east in the troposphere. Jet streams may be likened to rivers that flow in the sky. The water swirls and makes waves as it flows over and rocks in the stream. The stream's behaviour is fairly predictable as long as nothing in the river bed is moved. El Niño, however, moves the rocks. This results in a change of location and size of the resulting waves. Since the wind speeds and locations of jet stream waves dictate patterns of stormy and fair, wet and dry weather to places as far downstream as Africa, El Niño's effects are indeed global.

## **La Nina**

La Niña is the cold counterpart of El Niño where sea surface temperatures in the tropical Pacific fall below normal. La Nina brings warm winters in the southeastern United States, colder than normal winters from the Pacific Northwest to the Great Lakes, and unsettled winters in the Northeast and Mid-Atlantic states. The original name given to this Cold Phase was "El Viejo" meaning (the old man).

## Keywords and Vocabulary

Complete the following vocabulary activity by placing the letter of the correct definition beside the corresponding term.

- |                       |   |
|-----------------------|---|
| 1. Meteorology _____  | A the closest gas layer to earth                                |
| 2. Atmosphere _____   | B a wind found in the troposphere moving from east to west      |
| 3. Troposphere _____  | C forms when a cold front moves in above a warm front           |
| 4. Stratosphere _____ | D 0 degrees latitude  |
| 5. Mesosphere _____   | E large bodies of heated or cooled air                          |
| 6. Ionosphere _____   | F the study of weather  |
| 7. Equator _____      | G an instrument used to measure air pressure                    |
| 8. Molecule _____     | H caused by the continual rising of hot air and falling of cold |
| 9. Wind _____         | I occurs when water vapour cools and gathers                    |
| 10. Masses _____      | J the gasses that surround our earth                            |
| 11. Jet Stream _____  | K one layer closer than the ionosphere.                         |

12. Prevailing Winds \_\_\_\_\_ L described as feathery
13. High pressure system \_\_\_\_\_ M H<sub>2</sub>O
14. Low pressure system \_\_\_\_\_ N one layer beyond the troposphere.
15. Climate \_\_\_\_\_ O a mass of cooler air
16. Cirrus \_\_\_\_\_ P the layer of air furthest from the Earth
17. Stratus \_\_\_\_\_ Q the general pattern of weather in one area over time
18. Cumulus \_\_\_\_\_ R a mass of warmer air
19. Humidity \_\_\_\_\_ S occurs when water rises into the atmosphere
20. Evaporation \_\_\_\_\_ T they often bring storms
21. Condensation \_\_\_\_\_ U occurs when water falls to the ground
22. Precipitation \_\_\_\_\_ V vapour that is held in the air and does not condense into clouds
23. Fronts \_\_\_\_\_ W where a cold and warm air mass meet
24. Tornado \_\_\_\_\_ X look like flat sheets
25. Barometer \_\_\_\_\_ Y dominant wind patterns

## The World's Climatic Regions

Use an atlas to discover the answers to the following questions:

1. Find the sub-divisions of the following climatic regional categories:

a) Polar \_\_\_\_\_  
\_\_\_\_\_

b) Middle Latitude \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

c) Sub-tropical \_\_\_\_\_  
\_\_\_\_\_

d) Tropical \_\_\_\_\_  
\_\_\_\_\_

e) Arid \_\_\_\_\_

f) High altitude \_\_\_\_\_

2. In which region are the following places found?

a) Collingwood \_\_\_\_\_

b) Somalia \_\_\_\_\_

c) Toronto \_\_\_\_\_

d) Florida \_\_\_\_\_

e) Bangladesh \_\_\_\_\_

f) Chile \_\_\_\_\_

## How Accurate is Your Thermostat?

Does it matter where the thermostat in your house is placed?

Why is it always downstairs? Complete the following chart to determine how best to measure the temperature of your home. Discuss the results with your parents and teachers.

Select two locations : one upstairs and one downstairs

Set up your thermometers at these two locations (hopefully, you'll be able to get two from school).

This may need to be a partnered activity if you do not have access to a thermometer.

Describe the location of the downstairs thermometer (ie. near window, height on wall)

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Describe the location of the upstairs thermometer. (ie. near bathroom, height on wall)

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Day	Downstairs temp.	Upstairs temp.	Variables that may affect temp.
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			

## El Nino

Indicate whether the following statements are true (T) or false (F)

1. \_\_\_\_\_ El Nino occurs every ten years, like clock-work.
2. \_\_\_\_\_ El Nino is a body of cold water that gathers in the Arctic.
3. \_\_\_\_\_ The trade winds, during El Nino, for some reason become very weak and can, in fact, reverse.
4. \_\_\_\_\_ During El Nino years, there are fewer hurricanes in the Atlantic.
5. \_\_\_\_\_ Originally, El Nino was seen to occur every year around Christmas, off the coast of Peru - and hence was given the name "Christ Child".
6. \_\_\_\_\_ Normally, the Earth's warmest water is in a huge pool near Australia.
7. \_\_\_\_\_ Usually the water is pushed to the west where it affects Indonesia.
8. \_\_\_\_\_ The change in ocean temperature has no effect on our weather patterns.
9. \_\_\_\_\_ Thunderstorms are only formed where the oceans are cool.
10. \_\_\_\_\_ The warm waters associated with El Nino are like giant rocks being placed in the Jet Stream.

11. \_\_\_\_\_ As a result, the waves of air currents are also disruptive - making for unpredictable weather "downstream".
12. \_\_\_\_\_ Places as far away as Africa can be affected by the El Nino warming phenomenon.
13. \_\_\_\_\_ La Nina is a result of abnormally cooler sea temperatures in the Pacific.
14. \_\_\_\_\_ La Nina brings abnormally cold winters to the areas of the Great Lakes.
15. \_\_\_\_\_ La Nina was originally named the old man.

## Factors Influencing Weather and Climate

Weather is the condition of the \_\_\_\_\_ in a certain place. The study of weather is called \_\_\_\_\_. Meteorologists are people who try to predict what the weather will be like. Since there are many different factors that affect weather, this can be a difficult job.

### Our Atmosphere

To understand what makes different types of weather, we must first read about our atmosphere and how the \_\_\_\_\_ and the \_\_\_\_\_ affect its

temperature. The atmosphere is an envelope of \_\_\_\_\_ around our earth, the first four are sometimes called:

*the t* \_\_\_\_\_,

*the st* \_\_\_\_\_,

*the me* \_\_\_\_\_,

*and the* \_\_\_\_\_.

The layer closest to the earth, the \_\_\_\_\_, contains the air we breathe.

This is also the layer where most clouds are formed.

*Meteorology stratosphere*

*atmosphere*

*troposphere*

*ionosphere*

*gasses*

*troposphere*

*layers*

*earth*

*mesosphere*

*meteorology*

*sun*

## The Earth's Atmospheric Layers

Part of the stratosphere is the ozone layer, which filters out dangerous radiation before it enters our atmosphere.

*Problem:* What is radiation? \_\_\_\_\_  
How are we exposed to radiation on a daily basis?

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*THINK:* What would happen if we did not have an ozone layer to protect us from radiation?

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*Research the ozone layer.*

1. List where you would go to find primary sources of information.

2. \_\_\_\_\_  
Where would you go to find secondary sources of information?

3. \_\_\_\_\_  
What has been happening to the ozone layer in recent years?

4. \_\_\_\_\_  
Can we stop this problem? How?

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## Hot and Cold Air

The sun's rays warm the atmosphere, but only a little, when they pass through it. It is the heat that is reflected from the earth that really warms the atmosphere. The atmosphere is not heated evenly, however, for two reasons.

**One:** Land *reflects* more heat than water.

**Two:** The sun's rays strike certain areas more directly because of the way the earth is tilted.

For this reason, the air above the equator, the imaginary line that circles the earth horizontally, is much warmer than the air above the North and South Poles. The North and South Poles are the northern and southern ends of the earth's axis. The cool air above the poles keeps large blocks of floating ice, called *icebergs*, from melting. They, in turn, keep the air above the poles cold.

### *Real World Connection*

*Current Event Story:* \_\_\_\_\_

1. Where does this story take place? \_\_\_\_\_
2. What is the weather like in this place? \_\_\_\_\_
3. What is the connection between this place's location with respect to the equator, water and/or the poles? Look for this place in an atlas and state its *exact location*.

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4. Why is this place in the news?

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## The Greenhouse Effect

**Problem:** What causes our Earth to maintain its heat?

**Hypothesis:**

**Apparatus:**

\* \_\_\_\_\_

\* \_\_\_\_\_

\* \_\_\_\_\_

\* \_\_\_\_\_

**Method:**

- 1) Each group will fill two bowls with equal amounts of water.
- 2) Place a thermometer in the water of each bowl.
- 3) Tightly secure a sheet of saran wrap over top of one of the bowls.
- 4) Place both bowls in the sun by a window.
- 5) Record the temperature changes of the water at five minute intervals.  
Record your results on a chart like the one below.

**OBSERVATIONS:**

Base Temperature	5 Minutes	10 Minutes	15 Minutes	20 Minutes
Uncovered Bowl				
Covered Bowl				

Graph the results of the observations as a line graph.

**CONCLUSIONS:**

Draw conclusions about the temperatures of the bowls of water.

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How does this experiment relate to global warming?

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What suggestions can you make to help solve the global warming problem?

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Create a scrapbook of ideas, items in the news that refer to global warming.